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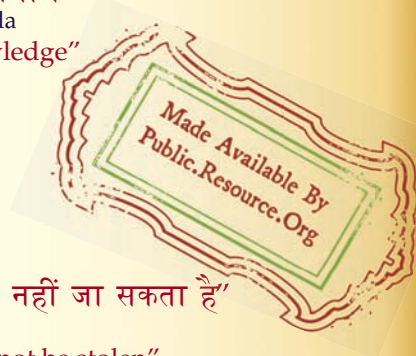
IS 6697 (1988): Hot-dip aluminium coatings on ferrous parts (other than sheet, strip and wire) for general purposes [MTD 24: Corrosion Protection]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

**HOT-DIP ALUMINIUM COATINGS ON FERROUS
PARTS (OTHER THAN SHEET, STRIP AND WIRE)
FOR GENERAL PURPOSES — SPECIFICATION**

(First Revision)

भारतीय मानक

**सामान्य कार्य के लिये लोहमय भागों (चद्दर, पत्ती और तार को छोड़कर) पर तप्त
निमज्जित एलुमिनियम लेपनों की विशिष्टि**

(पहला पुनरीक्षण)

UDC 669.718.65

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**BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002**

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 24 October 1988, after the draft finalized by the Hot-Dip, Sprayed and Diffusion Coatings Sectional Committee had been approved by the Structural and Metals Division Council.

This standard was first published in 1972. The present revision has been prepared in the light of the experience gained since its first publication and further technical developments in this field. Requirements concerning coating thickness and its measurement have been incorporated in this revision.

The hot-dip aluminium coatings of ferrous parts are used generally for providing protection against weather and atmospheric corrosion and to provide increased resistance to protection against oxidation at higher temperatures. This standard has been formulated with a view to achieving efficient protection of ferrous products by hot-dip aluminium coating of adequate and uniform thickness.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

HOT-DIP ALUMINIUM COATINGS ON FERROUS PARTS (OTHER THAN SHEET, STRIP AND WIRE) FOR GENERAL PURPOSES — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers the requirements for hot-dip aluminium coatings applied to ferrous products, such as pipes, tubings and valves, structural members and hardware.

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standards.

IS No.	Title
617 : 1975	Aluminium and aluminium alloy ingots and castings for general engineering purposes (<i>second revision</i>)
1387 : 1967	General requirements for the supply of metallurgical materials (<i>first revision</i>)
2590 : 1987	Primary aluminium ingots for remelting for general engineering purposes (<i>second revision</i>)
3821 : 1972	Method for determination of weight of coating on hot-dip aluminized iron or steel articles
6012 : 1970	Method for measurement of coating thickness by eddy current
8508 : 1988	Code of practice for hot-dip aluminizing of iron and steel (<i>first revision</i>)

3 SUPPLY OF MATERIAL

General requirements relating to supply of material shall conform to IS 1387 : 1967.

4 GENERAL REQUIREMENTS

4.1 Quality of Aluminium and Aluminium Alloy

Aluminium conforming to Grade IV (99.0 percent) of IS 2590 : 1987 should be used for general aluminizing work and aluminium-6 percent silicon alloy conforming to Grade 4300

(A-18) of IS 617 : 1975 should be used for the purpose of imparting high temperature oxidation and scaling resistance.

4.2 Aluminium

Hot-dip aluminium coating on ferrous products, as far as practicable, shall be done in accordance with IS 8508 : 1988.

5 COATING REQUIREMENTS

5.1 Workmanship and Finish

The aluminium coating shall be smooth, continuous, adherent, and free from injurious defects, such as, blisters, lumps, gritty areas, bare areas, pin holes, acid spots, dross warts, flux and excess aluminium on edges or other areas that will interfere with mechanical performance or corrosion resistance and other end use of the parts.

5.2 Mass

The minimum mass of aluminium coating shall be 120 g/m².

5.3 Thickness

The minimum thickness of aluminium coating shall be not less than 75 μ m at any place.

5.4 Adhesion

The coating, when tested in accordance with 6.2, shall not separate from the basis metal.

6 TEST METHODS

6.1 Mass of Coating

The mass of coating shall be determined in accordance with the method given in IS 3821 : 1972.

6.2 Adhesion Tests

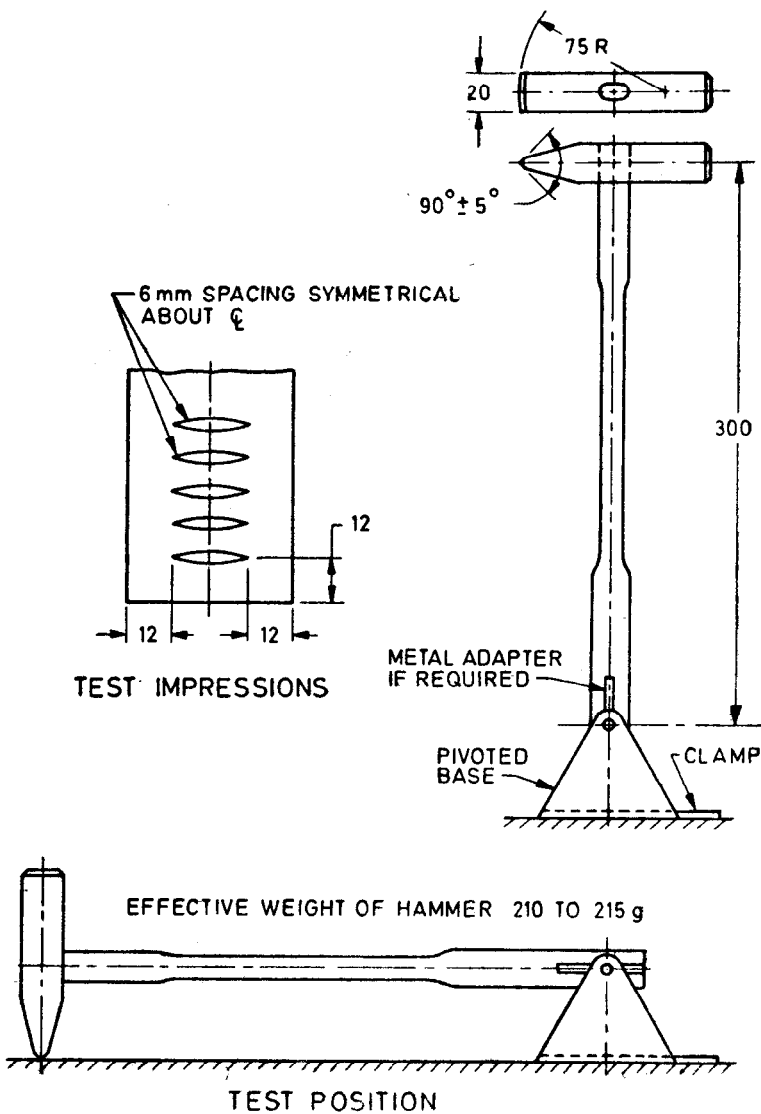
The pivoted hammer test as prescribed in 6.2.1 shall be used. In case it is not possible to carry out this test, knife test given in 6.2.2 shall be used.

6.2.1 Pivoted Hammer Test for Aluminium Coated Fabricated Products (Fabricated from Plates, Bars, Strip, etc)

The adherence of aluminium coating on steel shall be determined by the pivoted hammer test. The hammer used shall conform to Fig. 1. The hammer blow shall be controlled by holding the pivoted base of the handle on horizontal surface of the aluminized member and allowing the hammer to swing freely through an arc from vertical position to strike the horizontal surface. The test shall consist of two or more standard

blows forming parallel impressions with 6 mm spacing and a common axis, as illustrated in Fig. 1. No part of an impression shall be closer than 12 mm to the edge of the member. Removal or lifting of coating in the area between the impressions shall constitute failure. An extruded ridge less than 2 mm wide immediately adjacent to the impression shall be disregarded. The specimen shall be tested at several places throughout its length.

NOTE — The test is applicable to flat surfaces only and shall not be used on round or curved surfaces.



All dimensions in millimetres.

FIG. 1 PIVOTED HAMMER TEST

6.2.2 Knife Test for Aluminium Coated Hardware and Assembled Steel Products

When the coating is cut or pried into, such as, with a stout knife applied with considerable pressure in a manner tending to remove a portion of the coating, it shall only be possible to remove small particles of the coatings and it shall not be possible to peel any portion of the coating so as to expose the underlying iron or steel.

6.3 Coating Thickness Measurement

6.3.1 Non-Destructive Methods

Non-destructive thickness measurement shall be determined by instruments based on eddy current principle in accordance with IS 6012 : 1970. This method shall not be applicable to the welded portion and bended irregular surface. The instrument shall be calibrated by standard test piece of known coating thickness on same base metal as with that of the product. At least 5 measurements shall be made at one place on the testing surface and their average shall be taken as the thickness at that place. Similar measurement at a minimum of 5 different places shall be made.

6.3.2 Microscopic Method (Referee Method)

This method has been recommended as a referee method which shall be used in case of dispute. The thickness measurement by this method shall be determined in accordance with the method given in Annex A.

7 SAMPLING

The sampling shall be as agreed to between the processor/supplier and the purchaser.

8 INSPECTION

8.1 Visual inspection of material shall be made to determine conformity to the requirements of 5.1. When partial inspection warrants rejection of a lot, the supplier may re-sort the lot and submit it once again for inspection.

8.2 Should one specimen fail to conform to the requirements specified in 5.2 for the mass of the coating, two further specimens shall be tested. Failure of either of the two specimens to conform to the requirements shall be the cause for rejection of the lot which the samples represent.

8.3 Material that has been rejected may be stripped and re-aluminized and again submitted for test and inspection when they shall conform to the requirements of this specification, otherwise the entire lot shall be rejected.

9 MARKING

The finished product may also be marked by suitable means with the date of aluminizing, aluminizer's name or trade-mark, lot number, etc, for future reference.

ANNEX A

(Clause 6.3.2)

DETERMINATION OF THICKNESS BY MICROSCOPIC METHOD

A-1 PROCEDURE

In this method, thickness shall be determined by averaging at least five observations taken randomly from a single cross-section of the coating, excluding sites of excess aluminium accumulation or other obvious coating non-uniformity. The cross-section shall be taken either at the location

of maximum cross sectional thickness of the ferrous articles of production or portion of it shall be used as a test piece. The test piece shall be cut along longitudinal direction perpendicular to the surface. The sample shall be polished mirror finish and coating thickness of aluminium layer and alloy layer shall be measured by means of microscope, preferably at $100\times$.

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Doc : No. SMDC 28 (3412)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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